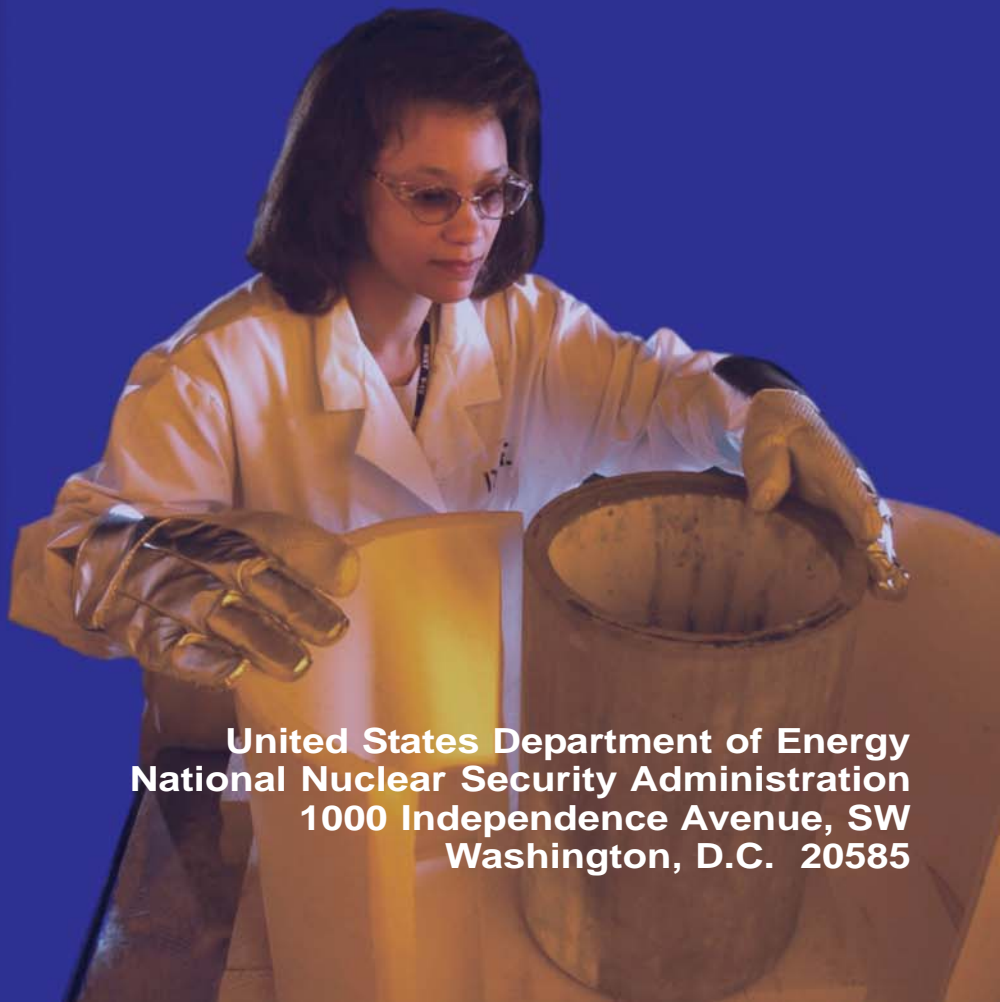
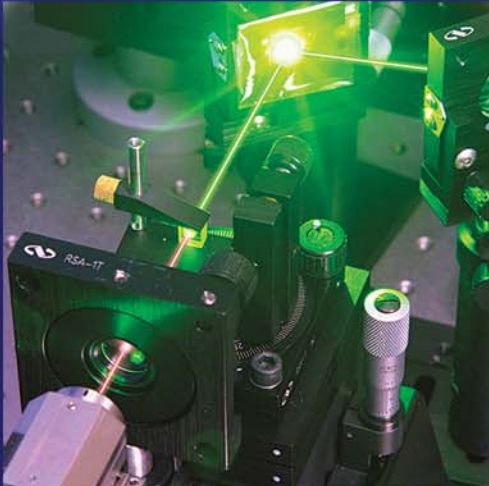


DOE/NA-0014

FISCAL YEAR 2007 - 2011

STOCKPILE STEWARDSHIP PLAN OVERVIEW

November 13, 2006



United States Department of Energy
National Nuclear Security Administration
1000 Independence Avenue, SW
Washington, D.C. 20585

United States Nuclear Weapons Stockpile

Bomb	Weapon System	Laboratories	Mission	Military Service
B61-3/4/10	F-15, F-16, and certified NATO aircraft	Los Alamos/Sandia	Air to Surface	Air Force
B61-7	B-52 and B-2	Los Alamos/Sandia	Air to Surface	Air Force
B61-11	B-2	Los Alamos/Sandia	Air to Surface	Air Force



B61



W62/W78/W87

Warhead	Weapon System	Laboratories	Mission	Military Service
W62	Minuteman III ICBM	Livermore/Sandia	Surface to Surface	Air Force
W78	Minuteman III ICBM	Los Alamos/Sandia	Surface to Surface	Air Force
W87	Minuteman III ICBM*	Livermore/Sandia	Surface to Surface	Air Force

* Beginning in FY 2007.

Warhead	Weapon System	Laboratories	Mission	Military Service
W76	D5 Missile, Trident Submarine	Los Alamos/Sandia	Underwater to Surface	Navy
W88	D5 Missile, Trident Submarine	Los Alamos/Sandia	Underwater to Surface	Navy



W76/W88



B83

Bomb	Weapon System	Laboratories	Mission	Military Service
B83	B-52 & B-2	Livermore/Sandia	Air to Surface	Air Force

Warhead	Weapon System	Laboratories	Mission	Military Service
W80-0	TLAM-N, Attack Submarine	Livermore/Sandia	Underwater to Surface	Navy
W80-1	ALCM/ACM, B-52	Livermore/Sandia	Air to Surface	Air Force



W80

Statement from the President

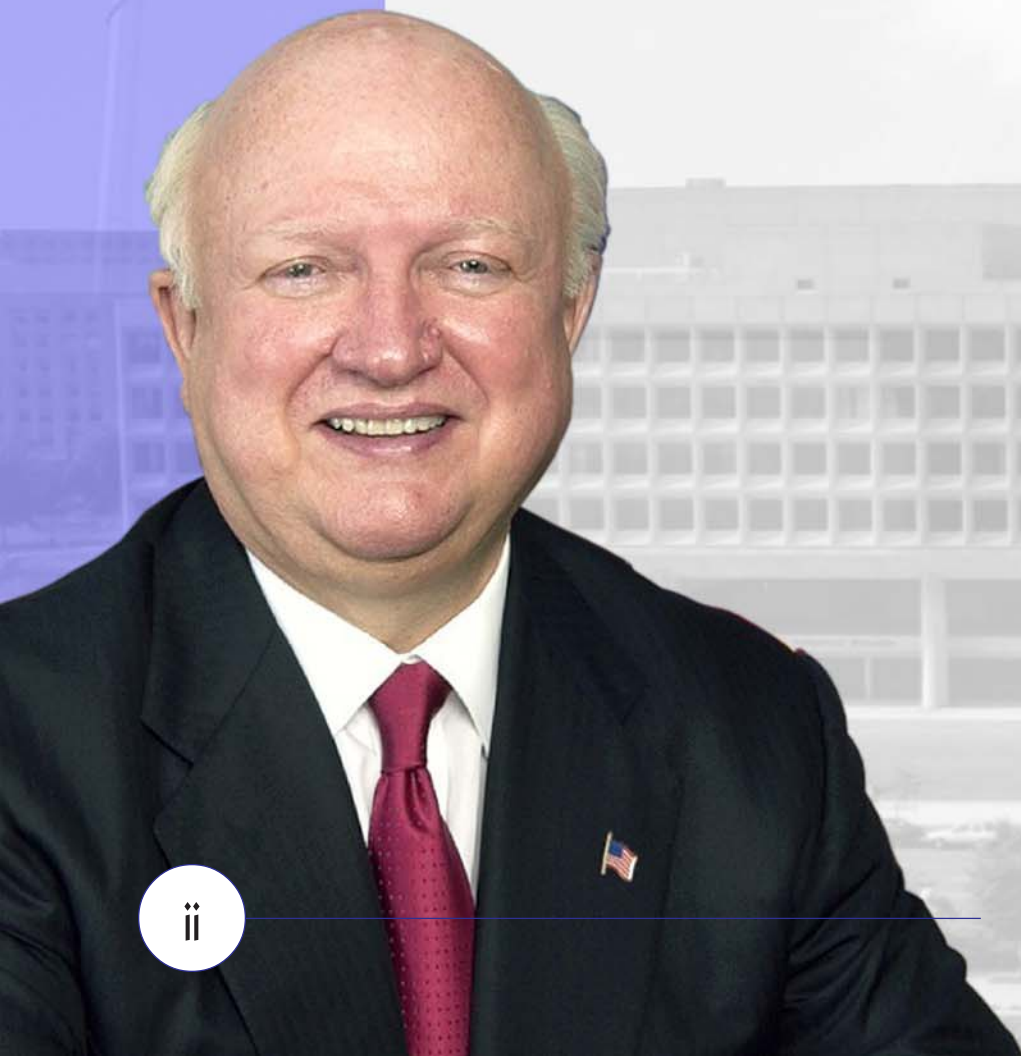
“We can, and will, change the size, the composition, the character of our nuclear forces in a way that reflects the reality that the Cold War is over. I am committed to achieving a credible deterrent with the lowest possible number of nuclear weapons consistent with our national security needs, including our obligations to our allies.”

President George W. Bush

Statement from the Secretary of Energy

“The Department is committed to ensuring the long-term reliability, safety, and security of the nation’s nuclear deterrent. ... To assure our ability to maintain essential military capabilities over the long term, however, and to enable deeper cuts in the stockpile through reduction of reserve warheads, we must make progress towards a truly responsive nuclear weapons infrastructure, as called for in the Nuclear Posture Review. The Department is moving down the path towards realizing its vision for a transformed nuclear weapon stockpile and infrastructure which are enabled by its Reliable Replacement Warhead Program and its initiative for a responsive infrastructure.”

Samuel W. Bodman
Secretary of Energy
February 16, 2006

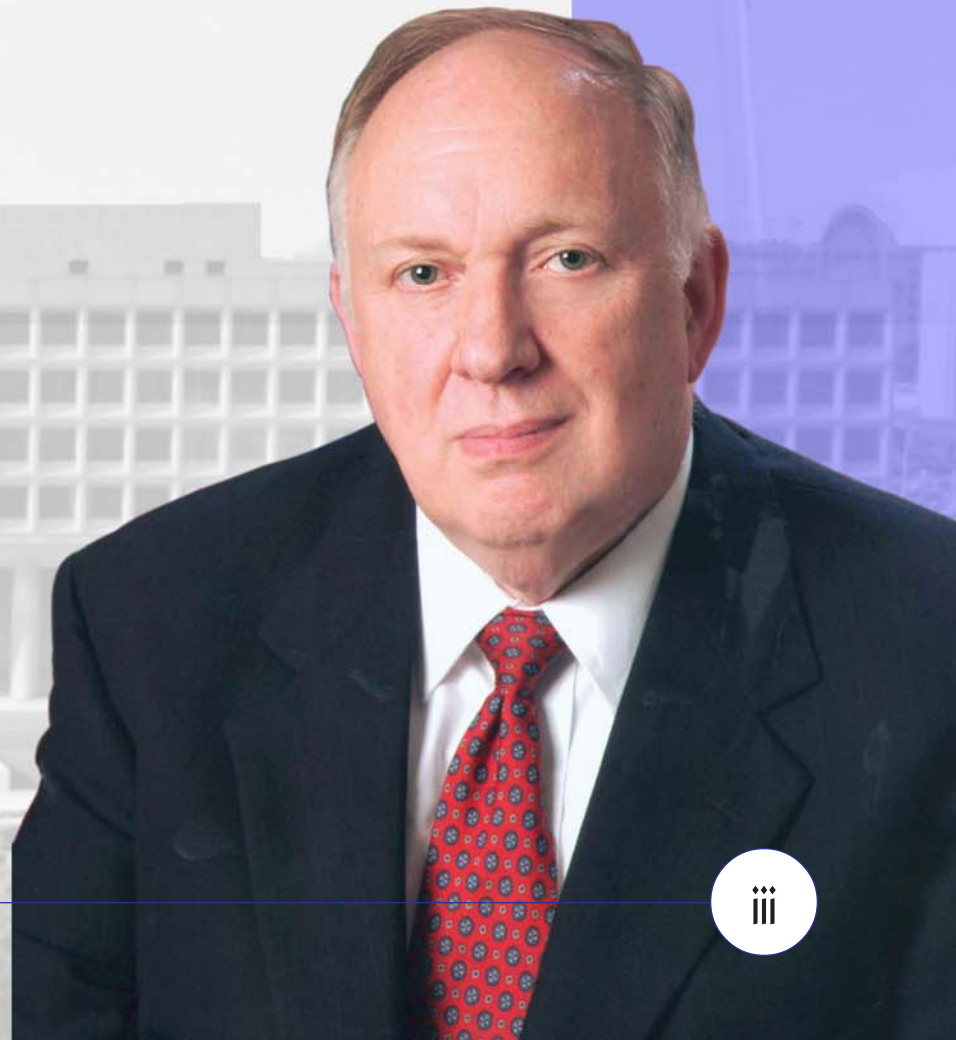


Statement from the Administrator

“...As we continue to draw down the stockpile... we must consider the long-term implications of successive warhead refurbishments. Each refurbishment takes us further from the tested configurations, raising concerns about our ability to ensure stockpile safety and reliability over the long term.

“To manage this long-term risk, we need to transform the nuclear weapons stockpile and the supporting infrastructure. Our concept for doing so depends on the Reliable Replacement Warhead (RRW). The RRW would relax Cold War design constraints that maximized yield to weight ratios and allow us to design replacement components that are easier to manufacture, are safer and more secure, eliminate environmentally dangerous materials, and increase design margins. This will both ensure long-term reliability and reduce the chance we would ever need to test again.”

Ambassador Linton F. Brooks
Administrator of the National Nuclear Security Administration
March 7, 2006



Message from the Deputy Administrator for Defense Programs

Each year, the Department of Energy's National Nuclear Security Administration (NNSA) prepares an update to the classified Stockpile Stewardship Program Plan as required by the National Defense Authorization Act for Fiscal Year 1998 (Public Law 105-85). This year, the Stockpile Stewardship Plan for FY 2007-2011, which is closely linked to the President's Budget, was submitted to Congress on May 2, 2006.

The Stockpile Stewardship Program has been used to ensure that the enduring stockpile is safe, secure, and reliable for over a decade. Now, the success of the Stockpile Stewardship Program continues to enable our path forward. This program has confirmed that it is becoming impractical and more costly to continue to maintain the Cold War-era stockpile over the long-term. Stockpile stewardship tools and expertise are now being applied to transform the nuclear weapons stockpile and the supporting infrastructure through a strategy based on the Reliable Replacement Warhead.

This Overview is intended to explain the key points of the Stockpile Stewardship Program as presented in the President's Budget request for FY 2007. In addition, this Overview highlights the transformation strategy that the NNSA has proposed to achieve the responsive infrastructure necessary to provide credible deterrence in the future. On April 5, 2006, I introduced our strategy, referred to as "Complex 2030" in my testimony to the House Armed Services Committee.

Thomas P. D'Agostino
Deputy Administrator for Defense Programs



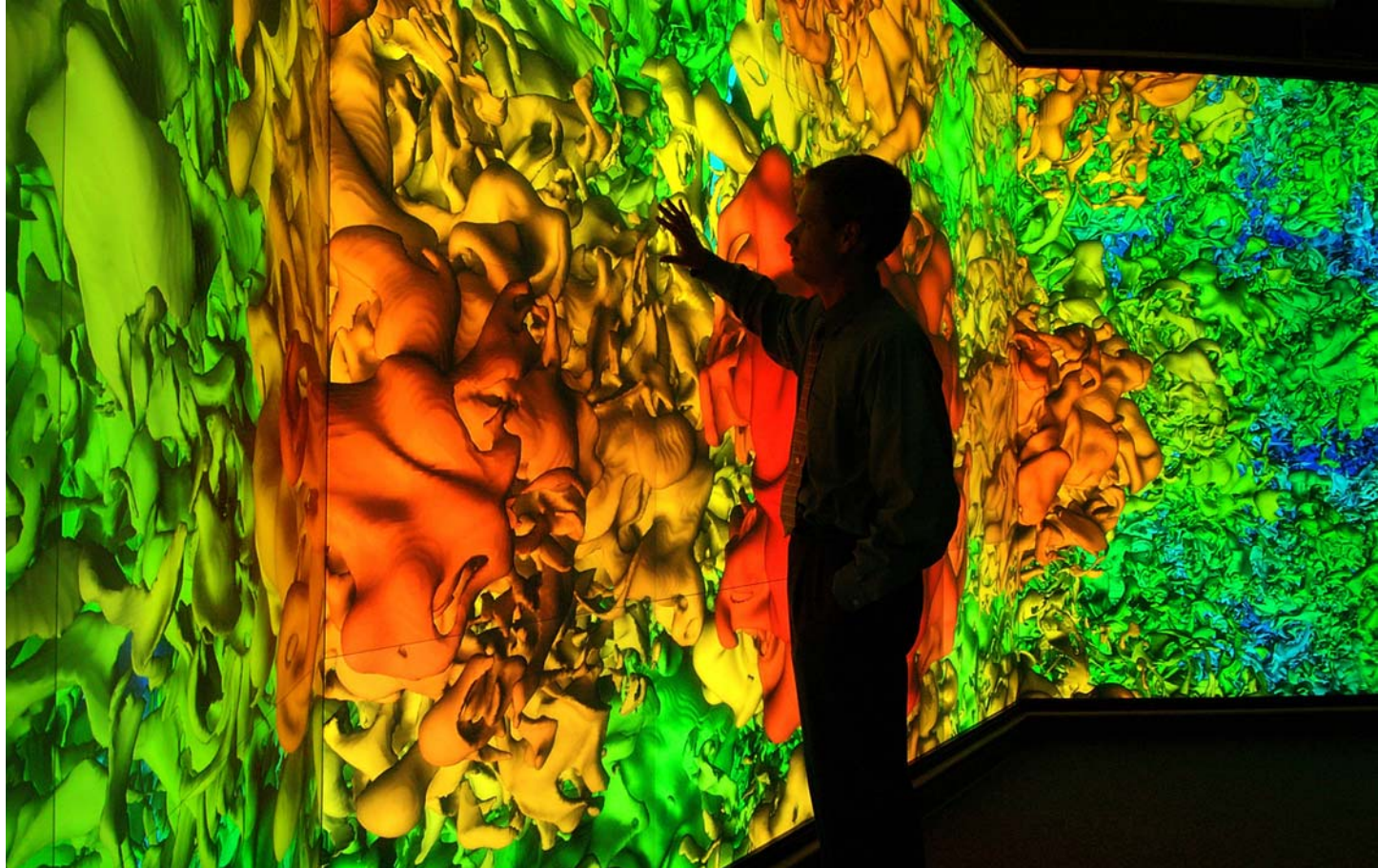


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Computer modeling and simulations are becoming integral to understanding all types of complex phenomena in science and engineering.

Pantex Plant

Mission:

Fabrication of chemical explosives, development work in support of design laboratories, and nuclear weapons assembly, disassembly, testing, quality assurance, repair, retirement, and final disposition.

Location:

Amarillo, Texas

Contractor:

BWXT Pantex, LLC



Y-12 National Security Complex

Mission:

Fabrication and assembly of precision parts and components from special nuclear materials and other materials for nuclear weapons.

Location:

Oak Ridge, Tennessee

Contractor:

BWXT Y-12, LLC



Kansas City Plant

Mission:

Manufacture and procurement of nonnuclear components for nuclear weapons. This includes electrical, electronic, electromechanical, mechanical, plastic, and nonfissionable metal components.

Location:

Kansas City, Missouri

Contractor:

Honeywell Federal Manufacturing and Technologies, LLC



Savannah River Site

Mission:

Loads tritium and non-tritium reservoirs to meet requirements of the Nuclear Weapons Stockpile Plan; conducts reservoir surveillance operations and gas transfer system testing; and, manages tritium inventories and facilities.

Location:

Aiken, South Carolina

Contractor:

Washington Savannah River Company, LLC



Nuclear Weapons Complex

Sandia National Laboratories

Mission:

Responsible for the development, testing, and production of specialized nonnuclear components and quality assurance and systems engineering for all nuclear weapons.

Location:

Albuquerque, New Mexico; Livermore, California; Kauai, Hawaii; Tonopah, Nevada

Contractor:

Lockheed Martin Corporation



Lawrence Livermore National Laboratory

Mission:

Design laboratory responsible for the safety and reliability of the nuclear explosives package in the nuclear weapons. Supports surveillance, assessment, and refurbishment of stockpile weapons. Possesses unique high-energy-density physics capabilities and scientific computing assets.

Location:

Livermore, California

Contractor:

University of California



Los Alamos National Laboratory

Mission:

Design laboratory responsible for the safety and reliability of the nuclear explosives package in the nuclear weapons. This laboratory possesses unique capabilities in neutron scattering, enhanced surveillance, radiography, and plutonium science and engineering.

Location:

Los Alamos, New Mexico

Contractor:

Los Alamos National Security, LLC



Nevada Test Site

Mission:

Safely conducts high-hazard operations, testing, and training in support of NNSA, Department of Defense, and other federal agencies. Provides the government with the capability to return to underground nuclear testing should the President deem it necessary.

Location:

Las Vegas, Nevada

Contractor:

National Security Technologies, LLC



Defense Programs - Getting the Job Done



** The B61-7 Life Extension Program First Production Unit was delivered in June 2006.*

- Continuing to deliver our products as we have been doing for the Department of Defense (DoD).
 - Limited life components, reliability assessments, etc.
- Eliminating the backlog of surveillance units by September 2007 consistent with an enhanced evaluation strategy (except the W84 and W88).
- Accelerating the dismantlement of retired weapons.
 - 49% increase from FY 2006 to FY 2007.
- Delivering the B61-7 Life Extension Program (LEP) First Production Unit (FPU)* by June 2006 and the B61-11 LEP FPU by January 2007.
- Delivering the W76 LEP FPU by September 2007.
- Certifying the W88 with a new pit and manufacturing ten W88 pits in 2007.
- Extracting tritium for use in the stockpile by September 2007.
- Supporting the science basis for warhead design, assessment and certification by completing and applying MESA (2008), DARHT (2008), NIF (2010), the Advanced Simulation and Computing Purple machine (2006) and pit lifetime estimates (2006).
- Transforming from a LEP to a RRW stockpile strategy (RRW to the Nuclear Weapons Council by November 2006).
- Transforming the nuclear weapons infrastructure to take Responsive Infrastructure from concept to reality (implement actions identified in Complex 2030 Preferred Infrastructure Planning Scenario and the Responsive Infrastructure Implementation Plan).

Introduction

The mission of the National Nuclear Security Administration (NNSA) is to strengthen national security through the military application of nuclear energy and by reducing the global threat from terrorism and weapons of mass destruction. The NNSA Stockpile Stewardship Program (SSP) mission supports national security by providing the capability to:

- Sustain a safe, secure, and reliable nuclear weapons stockpile to assure the security of the United States and its allies, deter aggression, and support international stability;
- Maintain a fully capable, agile, responsive nuclear weapons complex infrastructure to continue to support the stockpile and to be prepared for an uncertain and evolving threat environment; and,
- Conduct research and development (R&D) activities to ensure United States leadership in science and technology.

Stockpile Stewardship is working—the stockpile remains safe and reliable. SSP has ensured the vitality of the nuclear weapons stockpile without the use of underground nuclear testing for over a decade. This assessment is based on cutting-edge scientific and engineering experiments and analyses, including extensive laboratory and flight tests of warhead components and subsystems. Each year, a more complete understanding of the complex physical processes underlying the performance of our aging nuclear stockpile affirms the collective judgment of our scientific community. Now, the tools and expertise developed in the SSP are leading the way forward. The success of the SSP has established the foundation for safely managing the transition of the stockpile from the Cold War-era to the smaller, safer, and more secure stockpile of the future.

In 2001, the United States updated its policy on strategic deterrence, recognizing that the premise for our strategy had changed from one of deterring a peer adversary to one of agile responsiveness to evolving threats in a changing world. The Nuclear Posture Review (NPR) hence directed a change in the structure of the deterrent to adjust to the change in the nature of the threat. Specifically, the NPR called for the following:

- Change the size, composition, and character of the nuclear stockpile in a way that reflects the reality that the Cold War is over;
- Achieve a credible deterrent with the lowest-possible number of nuclear warheads consistent with national security needs, including obligations to our allies; and
- Transform the NNSA nuclear weapons complex into a responsive infrastructure that supports the specific stockpile requirements and maintains the essential U.S. nuclear capabilities needed for an uncertain global future.



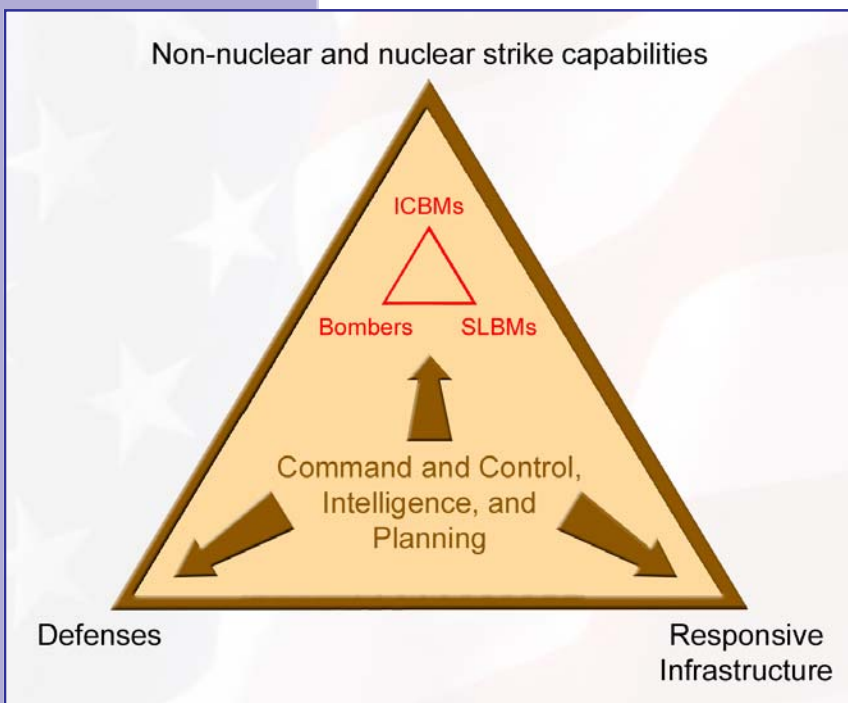
B61 bombs are the oldest designs in the nuclear stockpile and the Stockpile Stewardship Program assures that they continue to serve as an integral part of the nation's strategic defense.

This NPR furthermore concluded that a strategic posture based solely on offensive nuclear forces was unlikely to deter potential adversaries of the future. Hence, a capabilities-based concept, reflected in the New Triad, was established to provide more credible deterrence for the 21st century. The New Triad is composed of three major elements: Non-nuclear and nuclear strike capabilities; active and passive defense systems, and, responsive infrastructure. A responsive infrastructure is fully capable, resilient to unforeseen events, and is capable of always staying one step ahead of the adversary. A responsive NNSA infrastructure includes people, business practices, technical processes, the science and technology base, the R&D tools and production facilities that are able to sustain the nuclear weapons stockpile and guarantee the Nation's nuclear security in a dynamic and uncertain threat environment.

In response to the NPR, NNSA has worked closely with the Department of Defense (DoD) in accord with the following guidelines to achieve transformation of the stockpile and the infrastructure of the nuclear weapons complex:

- Ensure long-term safety, reliability, and security of the Nation's nuclear deterrent;
- Support the current stockpile while ensuring an effective and timely transformation to a future stockpile and infrastructure;
- Execute the Reliable Replacement Warhead (RRW) program to enable transformation of the stockpile and the infrastructure;
- Respond on appropriate timescales to adverse geopolitical change, or to technical problems with warheads or strategic delivery systems; and,
- Provide opportunities for a smaller stockpile to meet the President's vision for the lowest number of warheads consistent with the Nation's security.

The New Triad



Successfully transforming the nuclear weapons complex will enable the NNSA to achieve a smaller, safer, and more secure stockpile that will be maintained through a smaller, more efficient, responsive infrastructure. This modern stockpile will reduce the likelihood of a technical need for an underground nuclear test; will reduce the Nation's ownership costs for nuclear forces; and will enable a more technically versatile and a much more responsive infrastructure. Most importantly, this effort will ensure a credible deterrent for the 21st century and reduce the likelihood of having to employ nuclear capabilities in defense of the Nation.

Today's Nuclear Weapons Infrastructure

Today's nuclear weapons enterprise consists of eight geographically separated sites that comprise the R&D and production capabilities of the complex. There are three nuclear weapons design laboratories: Los Alamos National Laboratory (LANL), Lawrence Livermore National Laboratory (LLNL), and Sandia National Laboratories (SNL). In addition, numerous R&D activities, including subcritical experiments, are carried out at the Nevada Test Site (NTS). The production complex, which has undergone significant downsizing since the end of the Cold War, consists of the following "one of a kind" facilities:

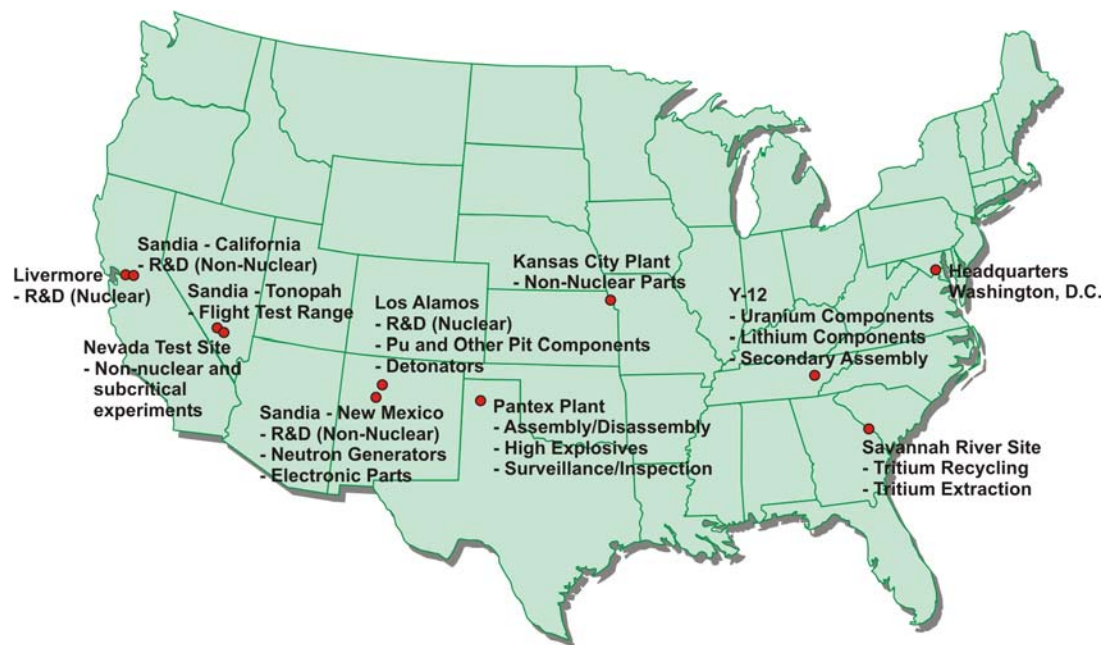
- The Y-12 National Security Complex (uranium and other components);
- The Pantex Plant (warhead assembly, disassembly, disposal, high explosive components);
- The Kansas City Plant (KCP) (non-nuclear components); and,
- The Savannah River Site (tritium extraction and processing).

In addition, production activities for certain unique, highly specialized weapons components occur at two national laboratories: SNL and LANL. These two laboratories have specialized facilities, capabilities, and technical expertise to perform these production activities.

From its origins in the Manhattan Project, the nuclear weapons complex and the stockpile it supports have experienced major changes. During the Cold War, the complex was comprised of 14 sites, which supported a stockpile significantly larger than today's. In the late 1980s, the nuclear weapons enterprise entered a period of decline as the Cold War ended and the Nation's attention shifted to site closures, greater emphasis on safety and environmental compliance, and downsizing of the nuclear stockpile. The 1992 moratorium on underground nuclear testing compelled the adoption of a new strategy to sustain the stockpile. The Cold War practice of replacing weapons in the stockpile every 15-20 years was replaced by applying advances in science and technology to extend the life of warheads in the existing stockpile beyond their originally planned lifetime. This was the genesis of today's Science-Based Stockpile Stewardship Program. The principal mission of stockpile stewardship is to analyze and predict the effects of changes in an aging stockpile, maintain a readiness posture for refurbishing weapons as needed, and developing the scientific and computational tools to assess and accept weapon component changes.

Dedication ceremony at the National Security Sciences Building, a new facility for theoretical and applied physics and computational sciences at Los Alamos National Laboratory.





DOE/NNSA Nuclear Weapons Complex

During the 1990s, stockpile reductions continued and funding priorities were focused on the scientific and technical capabilities that were required to assure the vitality of the stockpile. As a result, the production complex atrophied under funding insufficiencies, and key capabilities of the infrastructure have deteriorated significantly. Hence, the strengthening of production capabilities needed for the stockpile of the future must be a key focus as we transform our infrastructure. This includes exercising of capabilities. Key nuclear weapons design and manufacturing capabilities have lain dormant for nearly two decades. We need to map out a path forward that includes continuous, regular exercising of capabilities and provides opportunities for experienced designers and engineers to mentor the next generation of nuclear weapons scientists and engineers.

Six of today's nuclear weapons complex sites conduct operations with substantial quantities of plutonium and/or highly enriched uranium. As such, they host some of the most sensitive facilities in the United States. The increased threat to the physical security of weapons-usable nuclear materials and weapons components has led to increases in the costs to secure the complex over the past five years. This is an additional challenge that must be addressed by infrastructure transformation.

In January 2005, the Secretary of Energy requested the Secretary of Energy Advisory Board (SEAB) to empanel the Nuclear Weapons Complex Infrastructure Task Force. The objective of the Task Force was to assess the implications of Presidential decisions on the size and composition of the stockpile; the cost and operational impacts of the new Design Basis Threat (DBT); and the personnel, facilities, and budgetary resources required to support a smaller stockpile. The Task Force review entailed an evaluation of opportunities for the consolidation of nuclear materials, facilities, and operations across the complex to minimize security requirements and the environmental impacts of continuing operations.

After conducting a comprehensive analysis of the Department of Energy (DOE) nuclear weapons complex, the Task Force provided a vision for the nuclear weapons complex of the future. This vision was consistent in many respects with the plans that the Department

had begun to formulate to undertake a comprehensive consolidation of the nuclear weapons complex.

The SEAB Task Force concluded that: (1) the status quo is neither technically credible nor financially sustainable; (2) the Cold War stockpile should be replaced with a sustainable stockpile; (3) NNSA should complement past investment in the three design laboratories with investment in a modern 21st century production center; and (4) consolidation of Special Nuclear Material (SNM) is feasible and will save money by reducing DBT risk and security costs.

The Task Force recommended that DOE establish an Office of Transformation to serve as an agent for change. NNSA has created an Office of Transformation in Defense Programs and has commissioned it to lead the initiative known as Complex 2030 that will develop the plans and focus the efforts to transform the nuclear weapons complex in the coming decades.

Complex 2030: A Responsive Nuclear Weapons Infrastructure of the Future

In testimony given before the House Armed Services Committee, Subcommittee on Strategic Forces, on April 5, 2006, Mr. Thomas D’Agostino, the Deputy Administrator for Defense Programs, described “Complex 2030”—NNSA’s infrastructure planning scenario—that will establish a planning basis for actions required to revitalize, modernize, and reduce the size of the nuclear weapons complex so that it effectively meets its nuclear deterrence role in the future. “Complex 2030” is based on four strategies:

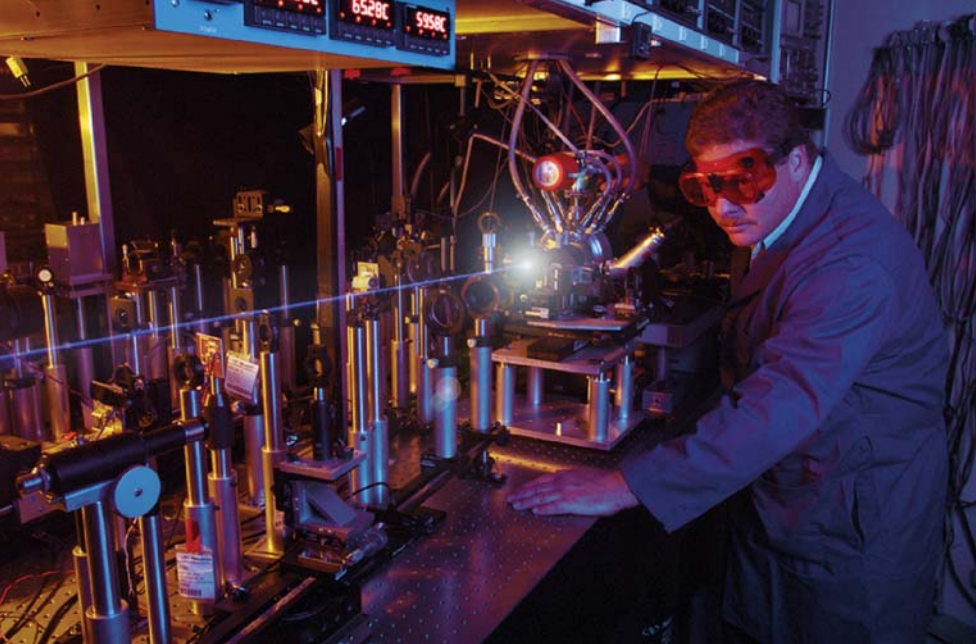
- In partnership with DoD, transform the nuclear stockpile through development of RRWs, refurbishment of limited numbers of legacy designs, and accelerated dismantlement of the Cold War stockpile;
- Transform to a modernized, cost-effective nuclear weapons complex;
- Create a fully integrated and interdependent nuclear weapons complex; and,
- Drive the science and technology base essential for long-term national security.

These strategies are complemented by a near-term commitment to build confidence in the transformation process by “getting the job done.”

The NNSA scenario for Complex 2030 is not the Cold War complex, nor is it the complex of today. Facilities, operations,

A member of the Nevada Projects Team, prepares the cathode cover of the Sandia-designed, high-intensity flash X-ray system for weapons certification.





An experiment being conducted at the High-Explosives Applications Facility at Lawrence Livermore National Laboratory.

and materials will be consolidated. There will be fewer sites and fewer locations within sites with large quantities of SNM. Hence, the physical footprint of the complex and the footprint of high security areas will be substantially reduced. Complex 2030 will include modernized production centers of excellence for plutonium, uranium, and tritium activities, and also for assembly and disassembly of warheads. Major science assets will be operated as national, shared, user facilities. Out-

sourcing of non-nuclear components will be maximized and a new facility designed for lean, modern manufacturing will be built for those components that cannot be outsourced. Complex 2030 will be integrated and interdependent, with more uniform business practices and technical processes, and fewer, more standard contracts. More efficient procurement of products and services will be achieved through use of a complex-wide supply chain management center. And, Complex 2030 will be characterized by a culture that manages risk through line management responsibility and decision-making that effectively balances program deliverables, site operations, and risk.

In Complex 2030, a more responsive nuclear weapons infrastructure becomes a reality while simultaneously meeting the commitments for today. The transformation of the nuclear weapons complex will be completed in a manner that seeks to avoid indications that it is a provocative expansion of our nuclear capabilities at a time when the President is committed to achieving a credible deterrent with the lowest possible number of nuclear weapons consistent with our national security needs. Establishing a responsive infrastructure to facilitate reductions in the number of weapons in the active stockpile, developing the RRW that reduces the risk of needing an underground nuclear test, and accelerating dismantlement of retired weapons are all vital elements of the path forward to Complex 2030.

In the next several years, Stockpile Stewardship and Complex 2030 will be judged, not only by the success of the continuing efforts to maintain the nuclear stockpile, but also by the success of efforts to plan and achieve transformation to a responsive nuclear weapons infrastructure. The term “responsive” refers to the agility of the nuclear weapons enterprise’s capabilities to respond to unanticipated events, such as a technical issue in the stockpile or the emergence of a new threat, as well as the ability to anticipate and counter innovations by an adversary before the Nation’s deterrent is degraded. The elements of a responsive infrastructure include the people, the science and technology base, the facilities and equipment to support a right-sized nuclear weapons enterprise, as well as practical and streamlined business practices that will enable the complex to respond rapidly and flexibly to emerging needs.

The NNSA has worked closely with the DoD and military services to establish objectives to ensure that Complex 2030 is responsive. Specifically, the NNSA responsive infrastructure

must provide proven and demonstrable capabilities on appropriate timescales, and in support of DoD requirements to:

- Identify, understand, and fix stockpile problems in time to assure continued confidence in the reliability and safety of the stockpile;
- Dismantle warheads on a timescale consistent with policy requirements;
- Ensure warheads are available to augment the operationally deployed force on a timescale that supports DoD requirements;
- Design, develop, certify, and complete first production units of refurbished or replacement warheads on a frequency that both sustains the stockpile and exercises the supporting infrastructure and critical skills;
- Improve the capability to design, develop, certify, and complete production of new or adapted warheads in the event of new military requirements;
- Produce required quantities of warheads in time to meet military requirements;
- Demonstrate nuclear competencies that assure allies, dissuade adversaries, and prevent technological surprise;
- Sustain readiness to conduct underground nuclear tests; and,
- Ensure an economically sustainable nuclear weapons enterprise.

The Stockpile Stewardship Program of Today

The established goals of the SSP are achieved through the integration of stockpile support, surveillance, assessment, design, and manufacturing processes. The need for these activities continues and the integrating strategies have evolved as the program has matured. The SSP is aligned with the FY 2007 Presidential Budget and is comprised of the following elements:

- Directed Stockpile Work (DSW);
- Campaigns;
- Readiness in Technical Base and Facilities (RTBF);
- Secure Transportation Asset (STA);
- Nuclear Weapons Incident Response (NWIR);
- Facilities and Infrastructure Recapitalization Program (FIRP);
- Environmental Projects and Operations Program (EPO); and,
- Defense Nuclear Security (formerly Safeguards and Security).

Technicians attach instrumentation to the exterior of a W80 Environmental Test Unit.



Directed Stockpile Work

The goal of DSW is to ensure that the nuclear warheads and bombs in the United States nuclear weapons stockpile are safe, secure, and reliable.

This goal is achieved by: (1) developing solutions to extend weapon life by means of identifying and correcting potential technical issues; (2) refurbishing warheads/bombs to install the life extension solutions and other authorized modifications to enhance safety, security, and reliability; (3) conducting evaluations to assess or certify warhead/bomb reliability and to detect/anticipate potential weapon issues, mainly from aging; (4) conducting scheduled warhead/bomb maintenance; (5) producing and installing limited use components; (6) dismantling warheads/bombs retired from the stockpile; (7) researching options which fulfill requirements for the RRW, and (8) providing the unique people skills, equipment, testers, and logistics support to perform nuclear weapons operations. The DSW effort has been coordinated with the DoD.

The Nuclear Weapons Council (NWC) approved the RRW Feasibility Study which began in May 2005 and is expected to take 18 months to complete. The goal of the RRW Study is to identify designs that will sustain long term confidence in a safe, secure, and reliable stockpile, and enable transformation to a responsive nuclear weapon infrastructure. The Joint DOE/DoD RRW Project Officer's Group (POG) was tasked to oversee a laboratory design competition for a RRW warhead with the first production unit goal of FY 2012. The POG will assess technical feasibility including certification without nuclear testing, design definition, manufacturing, and an initial cost assessment to determine whether the proposed candidates will meet the RRW study objectives and requirements. At the end of the study, the POG will establish the preferred RRW design options and present its recommendations to the NWC.

In FY 2007 specific activities include: with NWC approval, proceed with detailed design and preliminary cost estimates of RRW concepts to confirm that RRW designs provide surety enhancements, can be certified without nuclear testing, are cost-effective, and will support both stockpile and infrastructure transformation.

The nose cone of a B61-11 is being examined.



Campaigns

Campaigns are focused scientific and technical efforts to develop and maintain critical capabilities needed to enable continued certification of the stockpile for the long term. They are technically challenging, multifunctional efforts that have definitive milestones, specific work plans, and specific deliverables. Currently, there are six campaigns in the following areas:

- Science;
- Engineering;
- Inertial Confinement Fusion (ICF) Ignition and High Yield;

- Advanced Simulation and Computing (ASC);
- Pit Manufacturing and Certification; and,
- Readiness.

Science Campaign

The goal of the Science Campaign is to develop improved capabilities to assess the safety, reliability, and performance of the nuclear physics package of weapons without further underground testing; enhance readiness to conduct underground nuclear testing as directed by the President; and develop essential scientific capabilities and infrastructure.

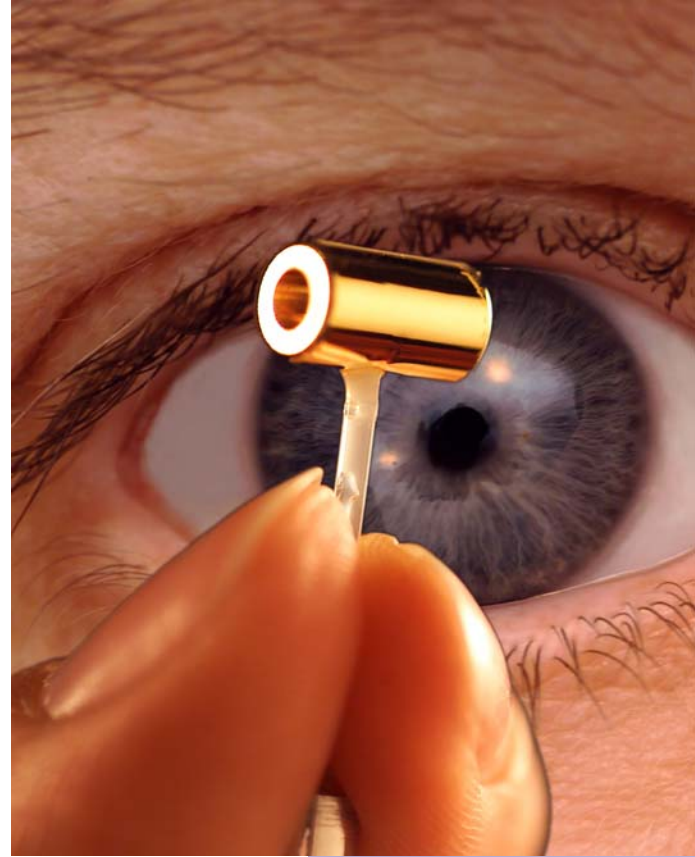
This includes providing capabilities to support continuous assessment activities, certification of Life Extension Program (LEP) and RRW warheads, improvements in response times for resolving significant finding investigations, and qualification of warhead replacement components that meet the goals of responsive infrastructure. As a part of this, the Science Campaign is principally responsible for the development of Quantification of Margins and Uncertainties (QMU), which is the methodology that applies scientific capabilities to stockpile certification issues, and to communicate certification findings in a common framework.

The pace of work under the Science Campaign is timed to support an ASC Campaign milestone in FY 2010 to release substantially improved simulation codes for primaries and secondaries in support of RRW and other certification requirements in the 2012 time frame. This shared code release will require the incorporation of improved physics and materials models, which must be provided by FY 2009, including validated models for plutonium equation of state and constitutive properties, improved boost physics models, completion of the Dual Axis Radiographic Hydrodynamic Test 2nd axis as a validation tool, and the use of the High-Energy-Density Physics (HEDP) facilities.

The Science Campaign is the principal mechanism for supporting the science required to maintain the technical vitality of the national nuclear weapons laboratories, to enable them to respond to emerging national security needs and to maintain a technological edge to prevent a national security surprise. As such, the campaign also develops and maintains the scientific infrastructure of the three national nuclear weapons laboratories and maintains a set of academic alliances to help ensure scientific vitality in important fields of research. The Science Campaign is maintaining readiness to conduct underground nuclear testing as directed by the President.

Engineering Campaign

Four Engineering Campaign subprograms provide the Nuclear Weapons Complex with modern tools and capabilities in engineering sciences to ensure the safety, security, reliability, and performance of the current and future United States nuclear weapons stockpile and a sustained engineering basis for stockpile certification and assessments throughout the lifecycle of each weapon.



Closeup of a gold bohrbaum, where National Ignition Facility energy is converted to thermal X-rays.



The 1000th line-replaceable optical unit is maneuvered into position at the National Ignition Facility at Lawrence Livermore National Laboratory.

The goal of the Engineering Campaign is to develop capabilities to assess and improve the safety, reliability, and performance of the non-nuclear and nuclear explosive package engineering components in nuclear weapons without further underground testing. Additionally, the purpose is to increase our ability to predict the response of all components and subsystems to external stimuli (large thermal, mechanical, and combined forces and extremely high radiation fields), the effects of aging; and to develop essential engineering capabilities and infrastructure.

- *Enhanced Surety* – provides validated surety (safety, security, and control) technology as options for the stockpile refurbishment/replacement program to assure that modern nuclear surety standards are fully met and a new level of use-denial performance is achieved, and security for nuclear weapons remains effective against ever-changing threats.
- *Weapon Systems Engineering Assessment Technology* – provides the scientific understanding, experimental capability, diagnostic development and data required to develop and validate engineering computational models and develop assessment methodology for weapon design, manufacturing, qualification, and certification for the supporting R&D DSW needs to maintain the development capability of refurbishing weapons and transforming the stockpile, as required.
- *Nuclear Survivability* – provides the tools and technologies needed to design and qualify components and subsystems to meet requirements for radiation environments (e.g., intrinsic radiation, production and surveillance radiography), space environments, and hostile environments; develops radiation-hardening approaches and hardened components; and modernizes tools for weapon outputs. Validated tools and technologies for the entire stockpile, including current and future LEPs and other systems such as RRW are provided through this subprogram and its integration with weapon-specific DSW.
- *Enhanced Surveillance* – provides component and material lifetime assessments to support weapon refurbishment decisions and develops advanced diagnostics and predictive capabilities for early identification and assessment of stockpile aging concerns.

Inertial Confinement Fusion Ignition and High Yield Campaign

The goal of the ICF Ignition and High Yield Campaign is to develop laboratory capabilities to create and measure extreme conditions of temperature, pressure, and radiation relevant to nuclear weapon performance, and conduct SSP-related research in these environments. The Campaign has four strategic objectives related to the study of these HEDP conditions: (1) achieve ignition in the laboratory and develop it as a scientific tool for stockpile stewardship; (2) execute HEDP experiments necessary to provide advanced assessment capabilities for stockpile stewardship; (3) develop advanced technology capabilities that support the long-term needs of the SSP; and (4) maintain a robust national program infrastructure and scientific talent in HEDP.

The demonstration of laboratory ignition will be executed at the National Ignition Facility (NIF), following a well structured plan developed under the National Ignition Campaign (NIC). The NIF/NIC, as the major focus of the ICF Campaign, encompasses a plan to perform the necessary research, technology development, procurement, engineering, and integration of hardware to perform a credible first ignition experimental campaign on the NIF in FY 2010. Continuing campaigns past 2010 will define physics requirements for ICF fusion in SSP applications and explore various drivers. The achievement of laboratory ignition on NIF, together with the contributions from other facilities of the NNSA complex, will provide an important component of the science basis for warhead design, assessment and certification.

In addition to NIF, the world's most powerful laser, located at the LLNL, the ICF Campaign utilizes two other second generation of world-class research facilities that are now in final stages of completion, the Z Refurbishment pulsed power facility at SNL and the OMEGA Extended Performance at the University of Rochester's Laboratory for Laser Energetics. While providing essential service for our Nation's nuclear security, all these facilities will also be configured as user facilities for the academic community as well.

The ICF Campaign is an essential part of the Complex 2030 paradigm, for which it is the lead on significant tasks such as formulating the plan for high-energy-density weapons physics experiments at NIF and, in partnership with other elements of NNSA, formulating the plan for efficient utilization and sharing of all ICF facilities and providing support for the Science, Technology, and Engineering Roadmap.

Advanced Simulation and Computing Campaign

The ASC Campaign develops leading-edge computational science as the surrogate to nuclear testing, allowing detailed simulation of complex weapons environments under nuclear conditions to support the broad portfolio of the nation's nuclear deterrence needs.

ASC meets weapons assessment and certification requirements by developing world-leading supercomputers that stimulate U.S. competitiveness, and complex computer codes that are leading the agenda for academic discussion of scientific predictions through simulations. Enabling competencies include building large-scale integrated physics codes validated through non-nuclear experimental data and legacy nuclear tests; developing the ability to quantify confidence bounds on the uncertainty in our results; incorporating the ASC tools into the QMU certification and assessment methodology; and



The ASC Purple computer at Lawrence Livermore National Laboratory.

providing the necessary computing hardware and software environments to code users, in collaboration with industrial partners, academia, and government agencies. ASC tools simulate device performance across the entire weapons lifecycle to include ensuring that systems in the stockpile meet all performance, surety and stockpile-to-target sequence requirements.

Future transformation of the stockpile will rely critically on ASC simulation codes, computational infrastructure and platforms. Only through validated ASC simulations can NNSA determine the effects of changes to current systems as well as margins and uncertainties in future, untested systems, such as the RRW. Growth in computing capacity under ASC contributes directly to increases in the efficiency, robustness, and flexibility of the RRW design process.

Pit Manufacturing and Certification Campaign

Within the Pit Manufacturing and Certification Campaign, three subprograms make unique contributions to SSP. The Pit Manufacturing subprogram objectives are to manufacture limited quantities of pits that meet all quality requirements for entry into the stockpile and

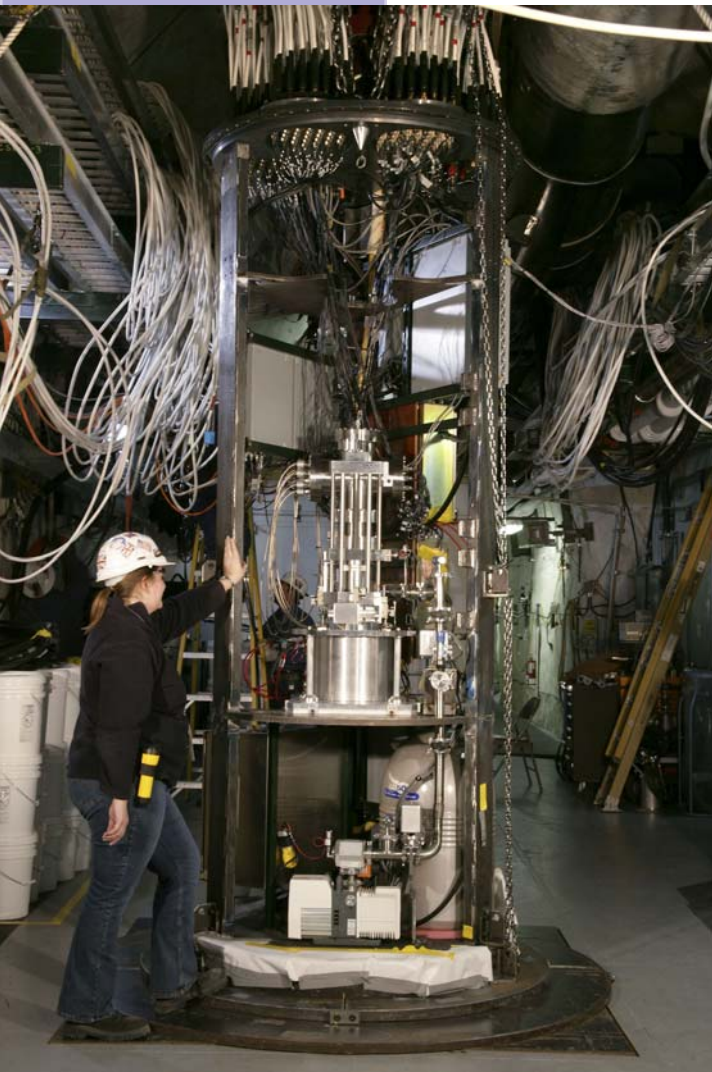
to develop a limited pit manufacturing capability at existing LANL facilities. The Pit Certification subprogram objective is to certify the nuclear performance of a W88 warhead with a LANL-manufactured pit by the end of FY 2007 without nuclear testing and to establish a basis for certification processes for future replacement pits. The Pit Manufacturing Capability subprogram objective is to establish the capability to manufacture replacement pits, other than the W88, by developing and demonstrating processes applicable to either existing LANL facilities or a long-term pit manufacturing facility. Both the Pit Manufacturing Capability and Pit Manufacturing subprograms contribute to the goals of responsive infrastructure by improving the technical capability and capacity of pit manufacturing at LANL.

Readiness Campaign

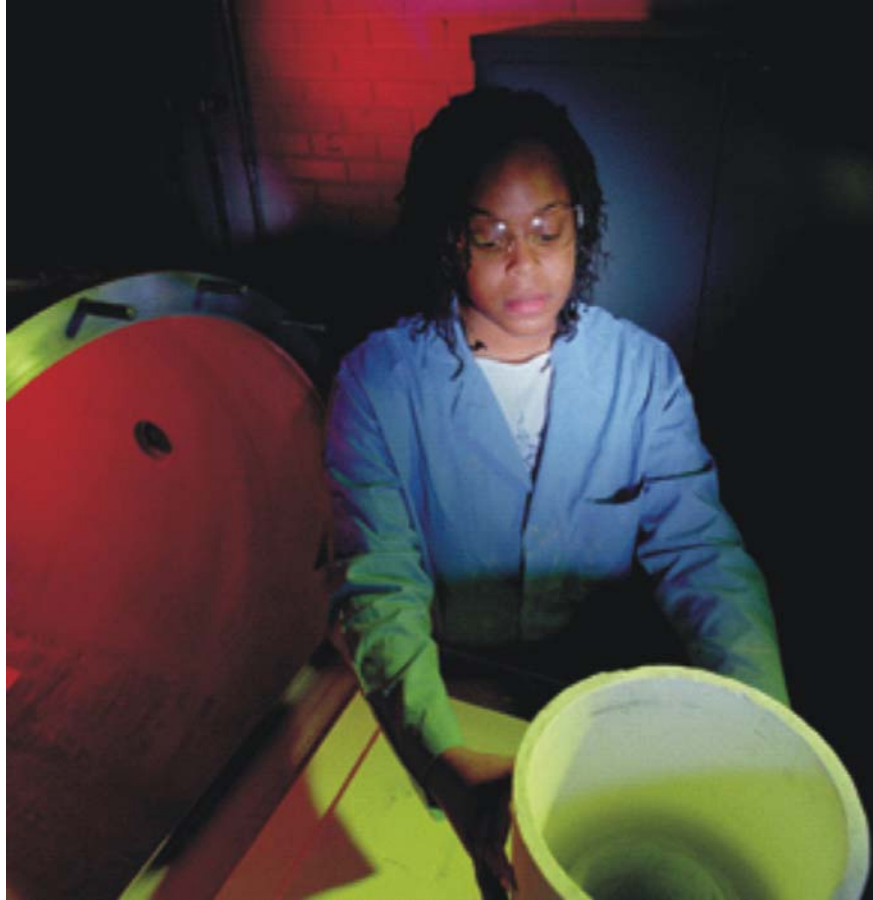
The goal of the Readiness Campaign is to develop and deliver design-to-manufacturing capabilities to meet the evolving and urgent needs of the stockpile and support the transformation of the Nuclear Weapons Complex into an agile and more responsive enterprise with shorter cycle times and lower operating costs.

As part of this goal, the Readiness Campaign serves its customer base with technology that contributes to faster implementation of new requirements, reduction in cycle times, less waste, leaner manufacturing (fewer components or processing steps), and a capable workforce. A key element of this goal is to ensure that the operating costs of the production complex can be optimized to meet customer needs as well as achieve greater efficiencies in operating the production complex to meet these needs.

The Krakatau subcritical experiment in a racklet configuration awaiting insertion at the U1a complex at the Nevada Test Site.



Today, and in the future, national defense faces significant challenges, some of which are posed by new forms of warfare, which in turn create new needs that require rapid response while assuring the safety and the reliability of the stockpile. The Readiness Campaign provides design-to-manufacturing and technological readiness capabilities that address current needs and have applications to respond to potential contingencies that may arise in the future. Readiness Campaign achievements have improved, and will continue to improve, the capability of the Nuclear Weapons Complex and its technology base to respond to special national defense needs in a timely manner. Such improvements enhance the Complex manufacturing capability with state-of-the-art equipment designs combined with cutting-edge applications, which enable the Nuclear Weapons Complex to quickly modify and enhance products, tools, and processes to respond to emerging needs; thus the Readiness Campaign contributes to establishing technological solutions that help attain responsive infrastructure goals. A substantial proportion of Readiness Campaign projects support the completion of two or more LEP First Production Units and initial production runs, and seeks to address base workload capability and future Nuclear Weapons Complex requirements.



The Readiness Campaign is developing microwave casting technology for the Complex of the future.

Readiness in Technical Base and Facilities

The goal of the RTBF Program is to operate and maintain NNSA program facilities in a safe, secure, efficient, reliable, and compliant condition, including facility operating costs (e.g., utilities, equipment, facility personnel, training, and salaries); facility and equipment maintenance costs (e.g., staff, tools, and replacement parts); and environmental, safety, and health (ES&H) costs; and to plan, prioritize, and construct state-of-the-art facilities, infrastructure, and scientific tools that are not directly attributable to DSW or a campaign, within approved baseline costs and schedule.

The RTBF Program achieves this goal so that NNSA program facilities are operationally ready to execute nuclear weapons stockpile stewardship tasks on time, as identified by DSW and the Campaigns. Work scope and costs include program contractor facility operations; facility and equipment maintenance; ES&H activities; the capability to recover and recycle plutonium, highly-enriched uranium, as well as to process and extract tritium to support a safe and reliable nuclear stockpile; and specialized storage containers sufficient to support the requirements of the nuclear weapons stockpile.

To accomplish the RTBF mission, the NNSA must reverse the deterioration of its nuclear weapons infrastructure, restore lost production capabilities, and modernize selected facilities in order to conduct scheduled refurbishments. The NNSA must also become more



The setting sun reflects off the glass of the cylindrical training center attached to Sandia's new MicroLab building.

responsive to current and future national security challenges, which requires revitalizing the nuclear weapons infrastructure. As highlighted by the DoD NPR, a highly responsive infrastructure itself can become part of a credible deterrent to our adversaries. RTBF plays a central role in this effort, and must continue to invest in improving the efficiency of the NNSA facilities and strengthening the technical base.

The RTBF Construction Program plays a critical role in revitalizing the Nuclear Weapons Manufacturing

and R&D infrastructure. Investments from this program will design and construct facilities that support the Nuclear Weapons Complex, improving the responsiveness and/or functionality of the infrastructure and its technology base. Before advancing to capitalized design efforts, conceptual designs for the projects are usually prepared using operating funds.

The RTBF Program partners with two other major elements within Weapons Activities with a focus on the overall Nuclear Weapons Complex. Those two elements are the FIRP and Responsive Infrastructure. The RTBF Program partners with the FIRP to restore the facilities and infrastructure of the Nuclear Weapons Complex and maintain them in appropriate condition to support the mission. This ensures that facilities necessary for immediate programmatic workload are maintained sufficiently to support that workload. The FIRP is a capital renewal and sustainability program that was established principally to reduce the large backlog of deferred maintenance that had developed during the 1990s to an appropriate level, consistent with industry best practices. The FIRP funding reduces deferred maintenance, recapitalizes the infrastructure, and reduces the maintenance base by eliminating excess real property. The NNSA will institutionalize responsible and accountable facility management practices, and will sustain the complex at or above industry standards.

The RTBF Programs is working to ensure the NNSA infrastructure is responsive and capable of maintaining the required stockpile size and composition and provides capabilities to achieve specified objectives. The RTBF program is involved in the decisions supporting the improved governance of the complex by maintaining inventory of existing infrastructure capabilities, supporting decisions to right-size the complex, and consolidation of materials to assist in footprint reduction thereby reducing costs associated with long-term security requirements.

Secure Transportation Asset

The goal of the STA Program is to safely and securely transport nuclear weapons, weapons components, and SNM to meet projected DOE, DoD, and other customer requirements. The role of the STA is increasing as the Department pursues the consolidation of nuclear materials and the dismantlement of retired warheads.

Nuclear Weapons Incident Response

The NNSA NWIR Program serves as the United States government's primary capability for radiological and nuclear emergency response. The NWIR provides funding for emergency management, operations, support and response activities that ensure a central point of contact and an integrated response to emergencies requiring DOE/NNSA expertise and technical assistance. The program is organized and personnel are trained to work as a team to respond with an effective range of technical and scientific capabilities to mitigate nuclear and radiological incidents worldwide.

NWIR provides core competencies in three areas:

1. Knowledge of U.S. nuclear weapons, radiological dispersal devices and improvised nuclear devices with specific specialties in spectroscopy, device modeling, radiography and device diagnostics, and assessment technology;
2. Technical operations (explosive ordnance disposal procedures and techniques for device access, disablement, render safe procedures, weapon recovery, stabilization and packaging and final disposition;
3. Technical support requirements (attribution, weapons effects, health and treatment capabilities and the radiological elements of consequence management.

Seven unique Departmental Emergency Response National Assets providing nuclear/radiological assistance in support of state and local agencies to responding to major national or international nuclear or radiological accidents or incidents. NWIR assets include the Aerial Measuring System, Accident Response Group, Atmospheric Release Advisory Capability, Federal Radiological Monitoring and Assessment Center and Consequence Management

Safeguard Transporters are used to securely transport nuclear weapons, weapons components, and special nuclear material.





A Radiological Assistance Program team member monitors radiation levels during a test drill.

Response Teams, Radiological Assistance Program, Radiation Emergency Assistance Center/Training Site, and Nuclear Emergency Search Teams. In addition, outreach, technical support, training and exercise support are continually provided to the response community.

NNSA provides robust emergency readiness and technical capabilities anchored by a cadre of highly trained, experienced scientific and technical personnel. Dynamic by design, these

technical capabilities continue to evolve to meet the given challenges associated with combating terrorism and changing accident/incident scenarios. NWIR capabilities and high level of readiness are validated through participation in international, military, Federal and state and local exercises and training events.

Facilities and Infrastructure Recapitalization Program

The FIRP mission is to restore, rebuild, and revitalize the physical infrastructure of the Nuclear Weapons Complex. This mission contributes significantly to the third leg of the new Triad, as identified in the 2001 NPR and supports the objectives of NNSA's transformation of the complex. FIRP applies new direct appropriations to address an integrated, prioritized series of repair and infrastructure projects focusing on legacy deferred maintenance that will significantly increase the operational efficiency and effectiveness of the NNSA Nuclear Weapons Complex sites. FIRP addresses the additional sustained investments above the RTBF base for focused reduction of deferred maintenance to extend facility lifetimes, reduce the risk of unplanned system and equipment failures, increase operational efficiency and effectiveness, and allow for the recapitalization of aging facility systems. FIRP works in partnership with RTBF to assure the facilities and infrastructure of the Nuclear Weapons Complex are restored to an appropriate condition to support the mission, and to institutionalize responsible and accountable facility management practices.

The FIRP Recapitalization subprogram funds projects in accordance with established criteria and priorities that target legacy deferred maintenance reduction and repair (non-programmatic) of mission essential facilities and infrastructure. These projects are key to restoring the facilities that house the people, equipment, and material necessary to support scientific research, production, or testing to conduct the SSP, and support the transformation of the complex. FIRP Facility Disposition activities reduce ES&H and security requirements, address a portion of the necessary footprint reduction of the complex, improve management of the NNSA facilities portfolio, and reduce long-term costs and risks.

Environmental Projects and Operations

The mission of the EPO Program is to continue to reduce risks to human health and the environment at NNSA sites and adjacent areas, by operating and maintaining environmental cleanup systems installed by the Office of Environmental Management, and performing

long-term environmental monitoring activities and analyses in a cost-effective manner that assures compliance with Federal, state, and local requirements and integrates a responsible environmental stewardship program with the NNSA's stockpile stewardship and national security efforts.

Beginning in FY 2007, NNSA will be responsible for the funding and management of Long-Term Response Actions/Long-Term Stewardship (LTRA/LTS), which includes activities such as groundwater treatment; environmental monitoring of surface water, ground water, soils, and landfill remedies; reporting and liaison requirements for various states; and surveillance/monitoring of contaminated decommissioned buildings that have not been demolished upon completion of Environmental Management program cleanup mission. These LTRA/LTS activities will be funded within the Weapons Activities appropriation within the EPO Program.

Defense Nuclear Security (Formerly Safeguards and Security)

This program provides protection for NNSA personnel, facilities, SNMs, nuclear weapons, and information from a full spectrum of threats, most notably from terrorism, which has become of paramount concern post the September 11, 2001, attacks on the Homeland.

The Defense Nuclear Security Government Performance and Results Act unit for NNSA security is comprised of two subprograms: Defense Nuclear Security managed by NNSA's Associate Administrator for Defense Nuclear Security and Cyber Security managed by the NNSA Chief Information Officer.

Physical Security constitutes the largest funding allocation of the NNSA security effort and includes:

- *Protective Forces* – a site's front-line protection, consisting primarily of armed uniformed officers;
- *Physical Security Systems* – provides intrusion detection and assessment barriers, access controls, tamper protection monitoring, and performance testing and maintenance of security systems;
- *Transportation* – security for intra-site transfers of SNMs, weapons, and other classified material that is not funded through STA;
- *Information Security* – provides protection for the classification and declassification of information, critical infrastructure, technical surveillance countermeasures, and operations security;
- *Personnel Security* – encompasses the processes for administrative determination that an individual is eligible for access to classified matter, or is eligible for access to, or control over, SNM or nuclear weapons; and

Members of NNSA's protective forces training with a firearm.





The Los Alamos National Laboratory Dual-Axis Radiographic Hydrodynamic Test facility will provide three-dimensional imagery of hydrodynamic behavior.

- *Materials Control and Accountability* – provides for the control and accountability of SNMs.

NNSA continues to maintain its Cyber Security defenses against cyber threats that are increasing in number, complexity, and sophistication while supporting the application of advanced information technologies to the NNSA national security and other missions. NNSA sites continue to improve the scope and quality of cyber security programs through the use of NNSA cyber security implementation guidance.

Major outyear considerations include: (1) Defense Nuclear Security will focus on deployment of new technologies to supplement protective forces; (2) The reengineering effort for NNSA personnel security will provide improvements for its security clearance process; and (3) Ongoing activities will maintain strong control and accountability of SNM,

increase experience and knowledge base of scarce highly-specialized technical resources, and expand efforts to implement a risk management-based approach to materials control and accountability.

Partnership Path Forward

The success of the SSP will continue to be anchored by a dynamic partnership between the DOE/NNSA and the DoD. The two Departments will continue to work closely to maintain the capability to sustain the nuclear deterrent, anticipate potential future situations, and preserve the flexibility to minimize the risk of future unforeseen problems that could reduce the effectiveness of our nuclear deterrent. Joint NNSA-DoD studies are evaluating potential changes to the stockpile based on RRW concepts and other considerations, with these objectives in mind:

- Ensure the viability of legacy weapons deployed to the stockpile until replaced through a comprehensive strategy of maintenance, surveillance, and refurbishment.
- Accelerate dismantlement completion from 2034 to 2023 of legacy weapons currently planned for retirement.
- Implement a RRW strategy as the “enabler” of transformation:
 - Establish an RRW-based stockpile plan by the end of 2007 with a majority of systems transitioned to RRW-types by 2030.
 - Ensure the stockpile has a heterogeneous mix of warheads for diversity.
 - Utilize the science-based stockpile stewardship tools established over the past decade to enable RRW design and certification without underground nuclear testing.

- Implement a continuous design/deployment cycle that exercises design and production capabilities and enables responsiveness of the Nuclear Weapons Complex:
 - Develop a business case for an optimal future design/deployment cycle that balances responsiveness objectives, weapon life-cycle costs, and training of new personnel.
- Transform the stockpile without underground nuclear testing; however, sustain the capability to conduct an underground nuclear test at the NTS.

Both Departments will continue to share responsibility for annually informing the President of the safety, security, and reliability of the nuclear weapons stockpile and preparing the Nuclear Weapons Stockpile Plan for Presidential approval.

The FY 2007 budget request for Defense Programs is balanced and responsibly allocated to adequately provide for the safety, security, and reliability of the nuclear weapons stockpile.

Conclusion

Nuclear weapons will continue to serve an essential role in United States National Security Policy in the 21st century, although that role will be quite different from what it had been throughout the latter half of the 20th century. Stewardship of the nuclear weapons stockpile and the supporting infrastructure compels the NNSA to anticipate change and plan for the future. Thus, the NNSA vision remains focused on continued reductions in the nuclear stockpile and the maintenance of a reliable and credible nuclear deterrent for the indefinite future. This will require the transformation of the stockpile to one that is capable of addressing future needs. Success in realizing this vision for transformation will enable the achievement, over the long term, of a smaller stockpile that continues to be safe, secure, and offers a reduced likelihood of future underground nuclear testing.

Sustaining confidence in safety, security, and reliability of warheads remains the fundamental objective of the SSP. As stewards of the nuclear stockpile, the NNSA must ensure that our nuclear weapons continue to serve their essential deterrence role by maintaining and enhancing the reliability, safety, and security of every nuclear weapon in the stockpile.

The SSP continues on a steady course and has greatly benefited from strong Administration and Congressional support, as well as effective integrated program planning, programming, budgeting, and evaluation. The Federal and contractor personnel in the nuclear weapons program are working as a team and achieving significant technical accomplishments. NNSA is executing



A technician uses a solid-phase microextractor to collect samples of gases produced by organic materials in a weapon.

detailed, integrated program implementation plans that depend on strong partnerships with the national laboratories, the production plants, the NTS, and United States industry. Furthermore, formal procedures and review processes are in place to ensure continuing confidence in the stockpile.

While the SSP has had a number of successes, the greatest challenges still lie ahead. Building on the major SSP accomplishments, and with the continued implementation of the overall program strategy, the NNSA is confident in its ability to maintain the safety, security, and reliability of the stockpile with concern for the environment, employees, and the general public. The NNSA is committed to this program and the President's overall goal of reducing global nuclear danger.

Acronyms



ASC	Advanced Simulation and Computing
DARHT	Dual-Axis Radiographic Hydrodynamic Test Facility
DBT	Design Basis Threat
DoD	Department of Defense
DOE	Department of Energy
DSW	Directed Stockpile Work
EPO	Environmental Projects and Operations
ES&H	Environment, Safety, and Health
FIRP	Facilities and Infrastructure Recapitalization Program
FPU	First Production Unit
HEDP	High-Energy-Density Physics
ICF	Inertial Confinement Fusion
KCP	Kansas City Plant
LANL	Los Alamos National Laboratory
LEP	Life Extension Program
LLNL	Lawrence Livermore National Laboratory
LTRA	Long-Term Response Actions
LTS	Long-Term Stewardship
MESA	Microsystems and Engineering Science Application
NIC	National Ignition Campaign
NIF	National Ignition Facility
NNSA	National Nuclear Security Administration
NPR	Nuclear Posture Review
NTS	Nevada Test Site
NWC	Nuclear Weapons Council
NWIR	Nuclear Weapons Incident Response
POG	Project Officers Group
QMU	Quantification of Margins and Uncertainties
R&D	Research and Development
RRW	Reliable Replacement Warhead
RTBF	Readiness in Technical Base and Facilities
SEAB	Secretary of Energy Advisory Board
SNL	Sandia National Laboratories
SNM	Special Nuclear Material
SSP	Stockpile Stewardship Program
STA	Secure Transportation Asset
Y-12	Y-12 National Security Complex

*Workers inspect the inside of the
NIF target chamber at Lawrence
Livermore National Laboratory.*



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